

WHAT IS CLAIMED IS:

1. A fast roaming system,

wherein a mobile terminal, while communicating with an access point, serving as a parent station, over a wireless LAN that conforms to the IEEE 802.11 specifications, can be quickly switched from the parent station to an adjacent access point having an overlapping communication range;

wherein the access point comprises

a wireless LAN interface for communicating with the mobile terminal over the wireless LAN,

a roaming unit for performing a roaming operation based on the IEEE 802.1113 specifications,

a beacon transmitter for transmitting a beacon signal to provide synchronization with the mobile terminal, and

a data transmitter for transmitting, to the mobile terminal, access point data required for the roaming operation; and

wherein the mobile terminal comprises

a wireless LAN interface for communicating with an access point over the wireless LAN,

an access point search unit for searching for peripheral connectable access points and for obtaining access point data,

a roaming execution unit for transferring the connection of the mobile terminal from a currently connected access point to another, designated access point,

an access point data table in which the access point data detected and obtained by the access point search unit are recorded, and

a function controller for, when a condition for communicating with the current access point matches a predetermined roaming operation start condition, employing a predetermined order sequence to select one of the access points entered in the access point data table, and for driving the roaming

unit to perform the roaming operation for the access point that is selected.

2. A fast roaming system according to claim 1, wherein the mobile terminal provides a roaming order as the order condition for the access point that is recorded in the access point data table; and wherein, until a roaming process is completed, the function controller repeats the roaming process in the roaming order to sequentially select a roaming destination.

3. A fast roaming system according to claim 2, wherein the mobile terminal monitors a reception level of a wireless signal received from an connectable access point, stores the reception level to the access point data table, and sets the roaming order beginning with the highest reception level.

4. A fast roaming system according to claim 2, wherein the data transmitter of the access point transmits, to the mobile terminal, the number of mobile terminals connected to the access point; and wherein the access point search unit of the mobile terminal stores, in the access point data table, the number of mobile terminals that is received, and sets the roaming order beginning with the smallest number of the mobile terminals connected to the access point.

5. A fast roaming system according to claim 2, wherein the data transmitter of the access point transmits, to the mobile terminal, an error ratio of data that are exchanged; and wherein the access point search unit of the mobile terminal stores the received error ratio in the access pint data table, and sets the roaming order beginning with the lowest error ratio.

6. A fast roaming system according to claim 2, wherein the data transmitter of the access point transmits, to the mobile terminal, a communication ratio for a communication band of the access point; and wherein the access point search unit of the mobile terminal stores the received communication ratio in the access point data table, and sets the roaming order beginning with the lowest communication ratio.

7. A fast roaming system according to claim 2,

wherein the data transmitter of the access point transmits, to the mobile terminal, traffic data that include the number of mobile terminals connected to the access point, the error ratio of data that are exchanged, and  
5 the communication ratio for the communication band of the access point;

wherein the access point search unit of the mobile terminal stores the number of mobile terminals, the error ratio and the communication ratio in the access point data table; and

wherein the function controller of the mobile terminal adds  
10 predetermined weights to multiple entries in the access point data table, including the number of mobile terminals, the error ratio and the communication ratio, obtains the sums for the individual access points, and sets the roaming order beginning with the smallest sum.

8. A fast roaming system according to claim 1, wherein the mobile  
15 terminal further comprises:

a reception level area, in the access point data table, for which, during communication, reception levels of wireless signals received from the parent station that is an access point are monitored and stored sequentially at  
predetermined times;

20 a level comparator for comparing the reception level of each received wireless signal with reception levels in the past;

a counter for counting the times for comparison; and

a roaming start instruction unit for defining, as the predetermined roaming start condition, when the result of the comparison, the reception level is  
25 lowered continuously by the number of times that matches a predetermined count.

9. A fast roaming system according to claim 8, wherein the mobile terminal further includes:

a roaming start instruction unit for comparing, with the reception

levels of signals received from the connected parent station, a reception level of a wireless signal obtained by the access point search unit, and for defining, as the roaming start, when the reception level of the signal obtained by the access point search unit is a predetermined value or larger.

5                   10. A fast roaming system according to claim 1, wherein the mobile terminal further includes:

                  a roaming start instruction unit for extracting an error ratio included in a beacon signal received from the connected parent station, and storing the error ratio, and for defining, as the roaming start, when the error ratio is larger  
10                   than a predetermined error ratio.

                  11. A fast roaming system according to claim 1,  
                  wherein the access point search unit of the mobile terminal obtains the end time of a contention-free period, which are included both a beacon signal and a probe response; and

15                   wherein, the access point search unit searches for peripheral access points during a period except for a period where data are transmitted and received, after the contention-free period is over.

                  12. A fast roaming system according to claim 1, wherein one selected access point is located as a master parent station for transmitting a  
20                   synchronized packet; and wherein the master access point includes

                  a synchronized packet transmitter for transmitting, to another access point, a synchronized packet that is synchronized with a beacon signal transmitted by the master access point; and wherein each of the other access points includes:

25                   a synchronized packet receiver for receiving the synchronized packet; and

                  a beacon transmitter for defining, as a reference time, the reception time for the synchronized packet, and for, after a predetermined time has elapsed following the reception of the reference time, transmitting a beacon

signal for each ratio channel, without overlapping a beacon signal from another access point.

13. A fast roaming system according to claim 12, wherein the access point search unit of the mobile terminal comprises:

5                   a passive scanner for receiving a beacon signal and for searching for an access point; and

                  a beacon table, in which the correlation between a wireless channel and a beacon transmission time is recorded,

                  wherein the passive scanner performs the passive scanning at the  
10               time recorded in the beacon table, excluding the time whereat the mobile terminal is transmitting and receiving data.

14. A fast roaming system according to claim 13, wherein the mobile terminal further comprises:

                  an active scanner for examining an access point from which a  
15               response is received relative to a search packet that the access point search unit has transmitted to the access point,

                  wherein, when the passive scanner fails to obtain the access point through passive scanning, the active scanner performs the active scanning.